**Statement Reporting on Progress by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS)**

**on Coordinated Response to UNFCCC Needs for Global Observations**

**59th Session of the of the Subsidiary Body for Scientific and Technological Advice (SBSTA)**

**30 November 2023, Dubai, United Arab Emirates**

The Nation of Canada, on behalf of the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) is pleased to provide this annual report to the 59th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) on the joint CEOS-CGMS response to the United Nations Framework Convention on Climate Change (UNFCCC) needs for systematic Earth observations as identified by the UN’s Global Climate Observing System (GCOS).

CEOS and CGMS are international organisations composed of 63 Member Agencies and Associates, and 16 Member Agencies, respectively.

They coordinate civilian space observation activities that advance knowledge of Earth’s environment. The Joint CEOS-CGMS Working Group on Climate focuses on activities supporting the GCOS Implementation Plan, a community-driven report documenting observation needs for addressing UNFCCC goals. Leveraging its Essential Climate Variables (ECV) Inventory[[1]](#footnote-0), the Working Group assesses GCOS requirements against the current and planned space architecture and climate records.

Over the past two years, the Agencies have focused significantly on the UNFCCC Global Stocktake, the first of a recurring global assessment of progress toward Paris Agreement goals. The Agencies provided satellite-derived measurements of greenhouse gases (GHGs), their surface exchanges, and other supporting data and information[[2]](#footnote-1). Besides supporting Global Stocktake process needs, these contributions are helping to address gaps in national assessments. Space agencies derived several conclusions from this pioneering activity:

* The world’s current climate observing infrastructure (space and *in situ)* is unprecedented and continues to advance. However, this infrastructure is not yet sufficiently comprehensive, robust or systematized to fully meet the needs of periodic and intercomparable Stocktakes. The Agencies strongly recommend an international focus on sustained observations -- both of greenhouse gas and non-greenhouse gas quantities and interoperable with the companion *in situ* and modeling infrastructures -- to enable well-evidenced Stocktakes needed to inform policy- and decision-making. Parties can also help by advancing national GHG emission Measurement, Reporting and Verification systems that leverage satellite data.
* Satellite capabilities for measuring GHGs are advancing rapidly, enabling operational global monitoring as well as facility-, urban- and basin-scale anomaly detection. Satellites can now detect methane leaks from fossil fuel facilities, and their abatement can slow the rate of climate warming. Satellites also detected regional GHG reductions during the COVID-19 pandemic, suggesting an emerging ability to assess impacts of mitigation actions. Strong effort is required to coordinate and integrate the new capabilities with monitoring programs, including WMO’s Global Greenhouse Gas Watch (GGGW).
* Space technologies are also advancing for estimating biomass carbon stocks and fluxes in the Agriculture, Forestry, and Other Land Use (AFOLU) sector. CEOS will publish an AFOLU Roadmap[[3]](#footnote-2) in November 2023 to complement its GHG Roadmap[[4]](#footnote-3) and provide a coherent path forward.
* Independent private sector entities, including academic and non-profit organisations, are rapidly contributing to the overall satellite infrastructure. The Agencies are developing frameworks to integrate these new contributions.
* IPCC-endorsed methods[[5]](#footnote-4) for estimating GHG inventories in support of Nationally Determined Contributions vary widely. Significant effort is required to align these methods and integrate observational and modeling capabilities.

In addition to supporting the Global Stocktake process, Agencies are comparing current and planned capabilities against the observing needs expressed in the 2022 GCOS Implementation Plan[[6]](#footnote-5). Initial results reveal that, for most ECVs, advanced space and ground capabilities support data collection and uses, such as detecting changing patterns and impacts. However, measurement continuity for some key ECVs (e.g., precipitation and some atmospheric gas profiles) is a top concern. Measurement gaps in time series reduce the ability to identify key environmental changes and patterns.

These findings, together with the Agencies’ contributions to a 2022 report to UNFCCC on systematic observations[[7]](#footnote-6), identify the research and observation capabilities, gaps and paths forward for supporting UNFCCC needs. The Agencies will use these findings to inform future activities. To help maximise their effectiveness, the Agencies continue to partner with other programs and organizations, including GGGW, the UN Environment Programme’s International Methane Emission Observatory, WMO’s Integrated Global Greenhouse Gas Information System and the Group on Earth Observations.

CEOS and CGMS welcome engagement with the Parties, and stand ready to support a new international focus on sustained observations as needed for recurring Stocktakes, as well as to expand capacity building activities for unleashing the full value of satellite data.

**CEOS and CGMS Agencies**

Agence Gabonaise d'Études et d'Observations

 Spatiales (AGEOS), Gabon

Agencia Espacial Mexicana (AEM), Mexico

Agensi Angkasa Negara (ANGKASA), Malaysia

Agenzia Spaziale Italiana (ASI), Italy

Australian Bureau of Meteorology (BoM)

Belgian Federal Science Policy Office (BELSPO)

Canada Centre for Mapping and Earth Observation

 (CCMEO)

Canadian Space Agency (CSA)

Centre National d’Etudes Spatiales (CNES), France\*

Centro para Desarrollo Tecnológico Industrial (CDTI),

 Spain

China Center for Resources Satellite Data and

 Applications (CRESDA)

China National Space Administration (CNSA)\*\*

Chinese Academy of Space Technology (CAST)

Comisión Nacional de Actividades Espaciales (CONAE),

 Argentina

Commonwealth Scientific and Industrial Research

 Organisation (CSIRO), Australia

Council for Scientific and Industrial Research (CSIR)

 South Africa

Crown Research Institute (CRI), New Zealand

Deutsches Zentrum für Luft-­‐und Raumfahrt (DLR),

 Germany

Earth System Science Organisation (ESSO), India

European Centre for Medium-Range Weather Forecasts (ECMWF)

European Commission (EC)

European Organisation for the Exploitation of

Meteorological Satellites (EUMETSAT)\*

European Space Agency (ESA)\*

Geo-­‐Informatics and Space Technology Development

 Agency (GISTDA), Thailand

Geoscience Australia (GA)

Global Climate Observing System (GCOS)

Global Geodetic Observing System (GGOS)

Global Ocean Observing System (GOOS)

Global Terrestrial Observing System (GTOS)

International Science Council (ISC)

International Geosphere-Biosphere Programme (IGBP)

India Meteorological Department (IMD)\*\*

Indian Space Research Organisation (ISRO)\*

Instituto Nacional de Pesquisas Espaciais (INPE), Brazil

Intergovernmental Oceanographic Commission (IOC)\*

International Ocean Colour Coordinating Group (IOCCG)

International Society of Photogrammetry and

 Remote Sensing (ISPRS)

Japan Meteorological Agency (JMA)\*\*

Korea Aerospace Research Institute (KARI)

Korea Meteorological Administration (KMA)\*

Ministry of Education, Culture, Sports, Science and

 Technology (MEXT)/Japan Aerospace Exploration

 Agency (JAXA)\*

National Aeronautics and Space Administration

 (NASA), USA\*

National Institute of Environmental Research (NIER),

 Korea

National Oceanic and Atmospheric Administration (NOAA), USA\*

National Remote Sensing Center of China (NRSCC)

National Satellite Meteorological Center (NSMC)/China

 Meteorological Administration (CMA)\*

National Space Agency of Ukraine (NSAU)

National Space Research Agency of Nigeria (NASRDA)

Netherlands Space Office (NSO)

Norwegian Space Agency (NOSA)

Polish Space Agency (Poland)

Portuguese Space Agency (Portugal Space), Portugal

Russian Federal Service for Hydrometeorology and

 Environmental Monitoring (ROSHYDROMET)\*

Russian Federal Space Agency (ROSCOSMOS)\*

Scientific and Technological Research Council of Turkey

 (TÜBITAK-­‐Uzay)

South African National Space Agency (SANSA)

Swedish National Space Agency (SNSA)

United Arab Emirates Space Agency (UAESA)

United Kingdom Space Agency (UKSA)

United Nations Economic and Social Commission for

 Asia and the Pacific (ESCAP)

United Nations Educational, Scientific and Cultural

 Organization (UNESCO)

United Nations Environment Programme (UNEP)

United Nations Food and Agriculture Organization (FAO)

United Nations Office for Outer Space Affairs (UNOOSA)

United States Geological Survey (USGS)

Vietnam Academy of Science and Technology (VAST)

World Climate Research Programme (WCRP)

World Meteorological Organization (WMO)

**\*Denotes Agencies being Member of both CEOS and CGMS. \*\*Denotes only CGMS Agencies.**

1. [CEOS-CGMS Inventory of Essential Climate Variable records](https://climatemonitoring.info/ecvinventory/) [↑](#footnote-ref-0)
2. [CEOS Global Stocktake Information Portal](https://ceos.org/gst/) [↑](#footnote-ref-1)
3. [Towards a roadmap for space-based observations of the land sector for the UNFCCC Global Stocktake](https://www.sciencedirect.com/science/article/pii/S2589004223005667) [↑](#footnote-ref-2)
4. [CEOS GHG Roadmap](https://ceos.org/observations/documents/CEOS_CGMS_GHG_Constellation_Roadmap_V2.3_cleaned.pdf) [↑](#footnote-ref-3)
5. [IPCC Updated Guidelines for GHG Inventories](https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/) [↑](#footnote-ref-4)
6. [2022 GCOS Implementation Plan](https://gcos.wmo.int/en/publications/gcos-implementation-plan2022) [↑](#footnote-ref-5)
7. [The Role of Systematic Earth Observations in the Global Stocktake](https://unfccc.int/documents/462475) [↑](#footnote-ref-6)